

Headquarters U.S. Air Force

Integrity - Service - Excellence

Does the LVC Construct Fit M&S?



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16 August 2011

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What Do These Have In Common?





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They Won Their Football Leagues Last Season!



Borrusia Dortmund FC
Bundesliga '11



Collingwood FC
AFL '10



Montreal Alouettes
Grey Cup Winners '10



Wigan Warriors RLFC
Super League '10



Spokane Shock
Arena Bowl XXIII '10



Green Bay Packers
Super Bowl XLV '11

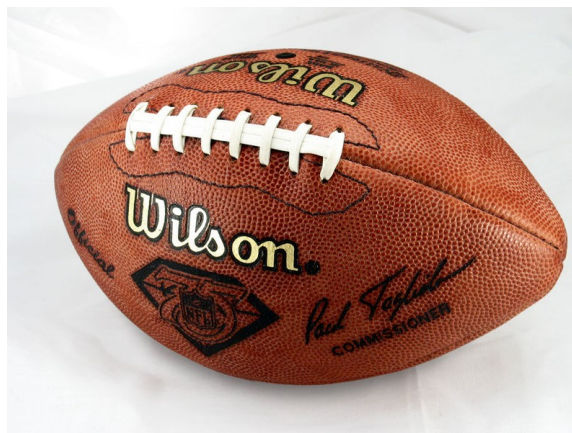
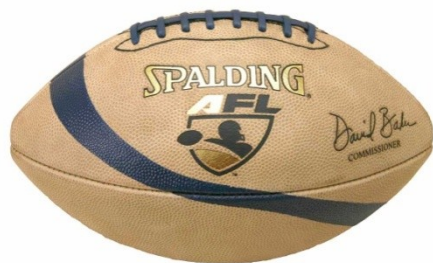


Auburn Tigers
BCS '10



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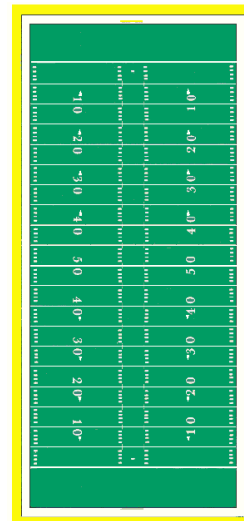
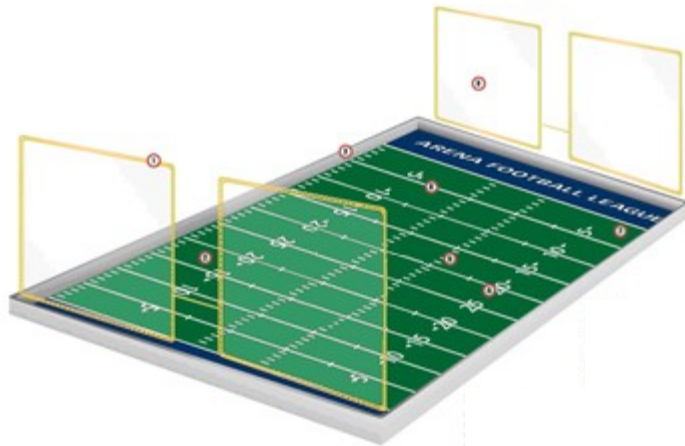
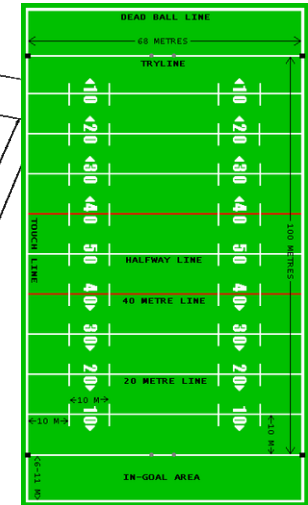
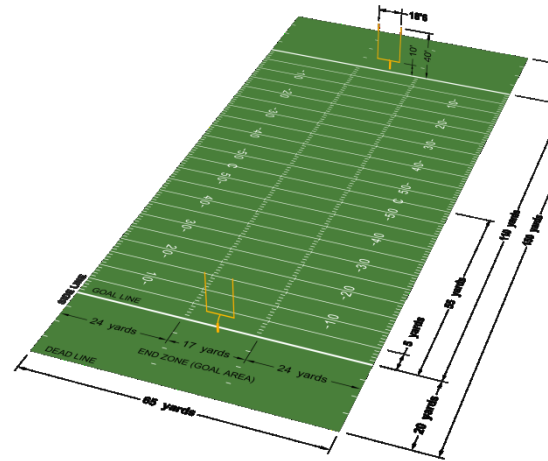
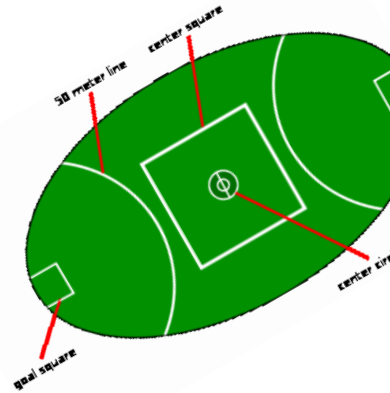
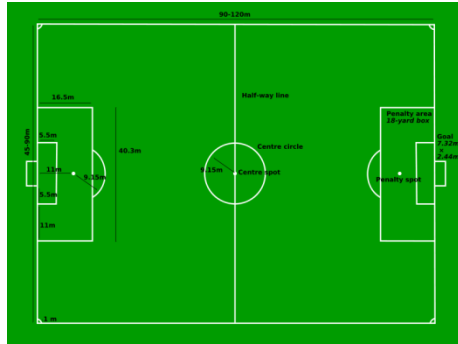
They Play With Different Balls





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They Play On Different Fields





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They Play With Different Rules And Equipment



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They Play For Different Trophies



Bundesliga Champions



AFL Premiership Cup



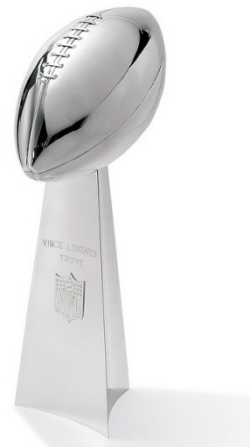
Grey Cup



Super League Cup



AFL Championship Trophy



Lombardi Trophy



BCS Trophy



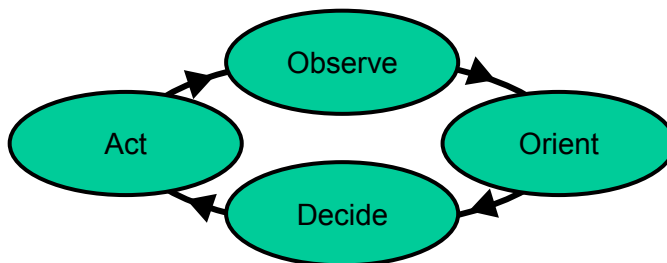
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**But they all call it
'Football'**

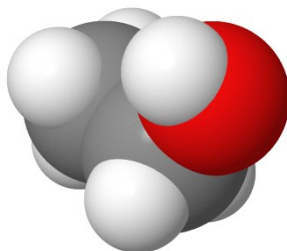


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What Do These Have In Common?



$$P_r = \frac{P_t G_t A_r \sigma F^4}{(4\pi)^2 R_t^2 R_r^2}$$



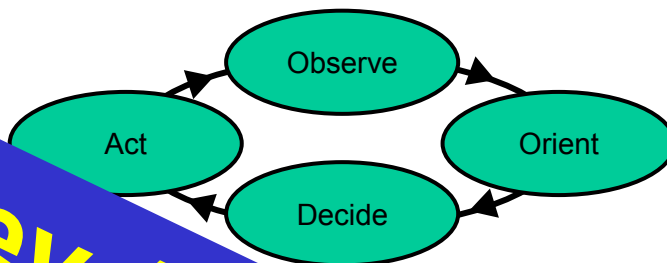
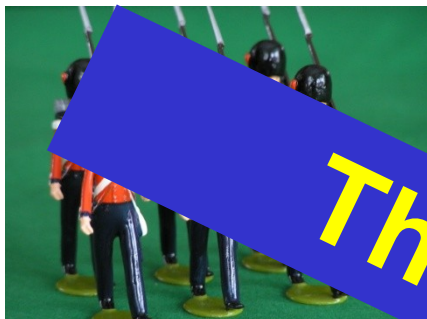
$$L = C_l A \cdot .5 \rho V^2$$
$$D = C_d A \cdot .5 \rho V^2$$





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What Do These Have In Common?



$$P_r = \frac{P_t G_t A_r \sigma F^4}{(4\pi)^2 R_t^2 R_r^2}$$



They Are All 'Models'



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What Is A Model And A Simulation?

- **Model** – “A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process”*

- **Simulation** – “A model represented over time”*

* DoD5000.59-M



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A Definition of M&S

- DoD5000.59-M, Modeling And Simulation Glossary (Jan 1998), defines: “Modeling and Simulation (M&S). The use of models, including emulators, prototypes, simulators, and stimulators, either statically or over time, to develop data as a basis for *making managerial or technical decisions*. *The terms "modeling" and "simulation" are often used interchangeably.*”

There are many definitions of M&S – all of them broad

- To properly scope the issue: M&S are Tools used to perform two distinct Mission Sets:
 - “*Make Better Decisions*” (Analysis)*
 - “*Develop Better Capabilities*” (Training)*

This is the ‘traditional’ way of looking at ‘M&S’

*SAF/A6W White Paper and M&S Enabling Concept



Some Other Definitions

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- Live Simulation – “Real people operating real systems”*
- Virtual Simulation – “Real people operating simulated systems”*
- Constructive Simulation – “Simulated people operating simulated systems”* (note: most Analytic Tools don’t have ‘simulated’ people)

- Live-Virtual-Constructive: “Categorization of simulation into live, virtual and constructive classes or divisions; together (LVC) indicates the integration of all three into a particular event or activity”*
 - Note: LVC and training are conducted in “Real Time”
 - “Many AF constructive applications (e.g., engineering use and much of AF analysis work) will not be used in an LVC environment, ...”+

LVC M&S (Training) is Distinct from Analytic M&S

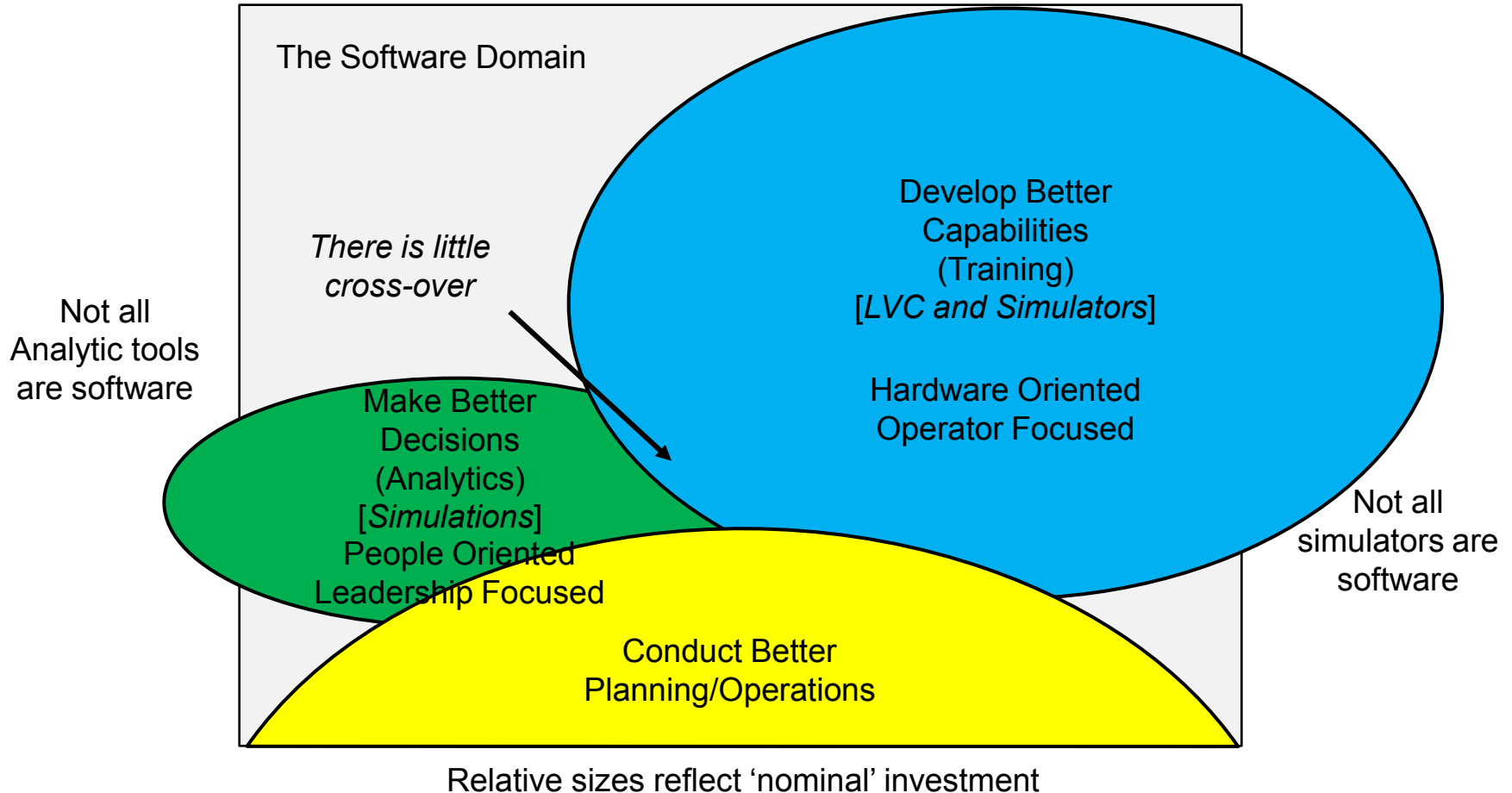
*DoD M&S Body of Knowledge +USAF LVC-IA Plan



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The Operating Space

'Governance' Requirements/Risk are different across M&S





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Major Differences

| <i>Analytics</i> | | <i>Training</i> |
|---|----------------------------|---|
| Leadership | Focus | Operators |
| Simplifications to critical factors in decision | Application | Realistic representation of complete system |
| Enhance clarity and understanding | Purpose | Enhance skills with machine interfaces |
| Human Analysts | Primary Resources and Cost | Hardware and software emulations |
| Faster than 'Real Time' | Time | Real Time' |
| <i>Better Decisions</i> | | <i>Better Capabilities</i> |



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M&S Management

Analytics

Analysts Qualifications

Personnel Costs

Quality Insights

Training (LVC)

Configuration Control

Hardware Costs

**Realistic Representation
(concurrency)**

***Policies and Management Approaches Need
To Be Appropriate***



Answer to the Question

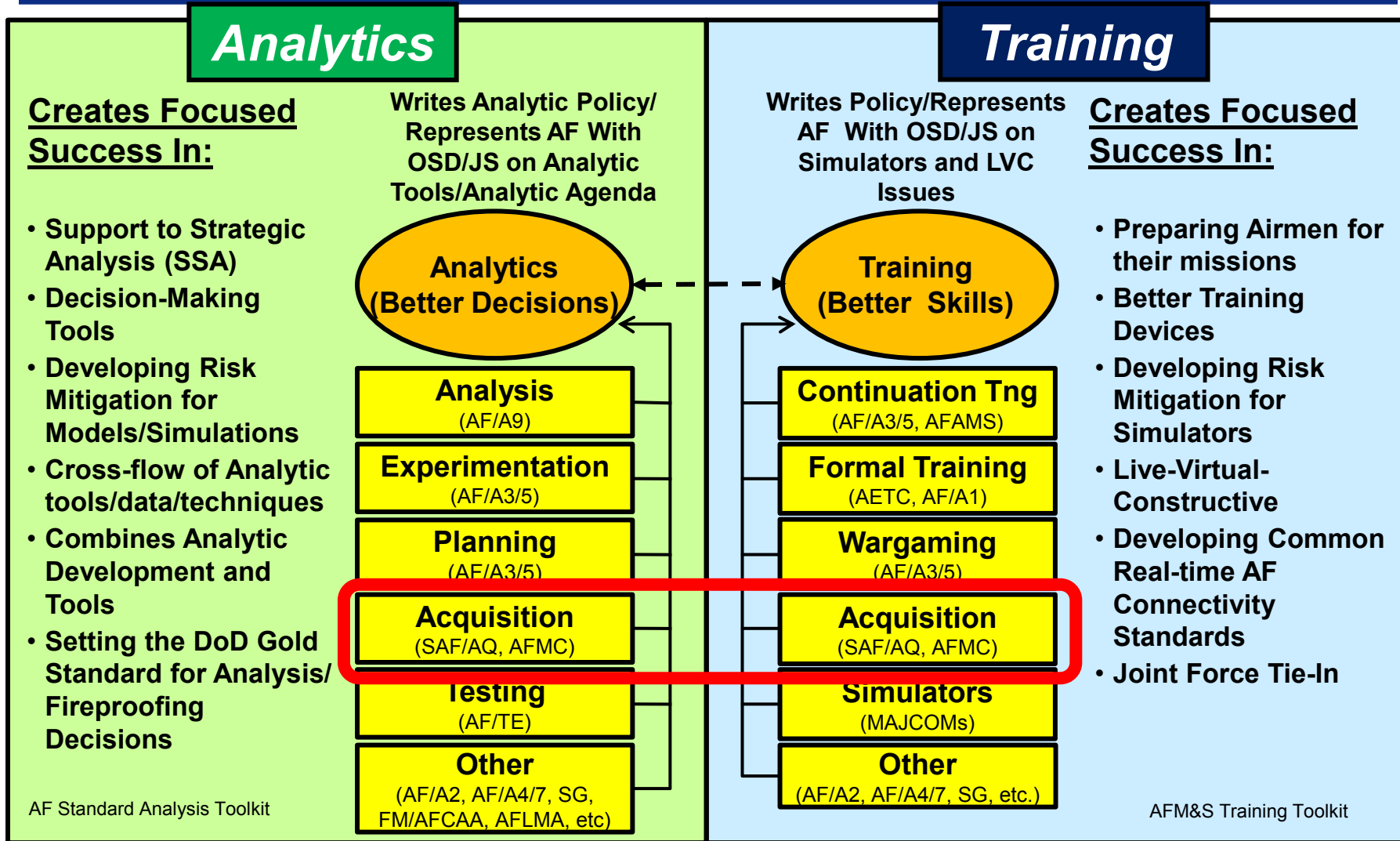
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- ***Does the LVC Construct Fit M&S?***
 - It fits Training and Exercise, not Decision Support Analytics
 - LVC *focus* is on interfacing Operators and their Systems
 - Decision Support *focuses* on the Decision, not the operator



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Analytics & Training Governance Considerations





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M&S Communities

- *Some Orgs predominately use one approach*
 - AETC, AFAMS: Training
 - AF/A9, ASC/END: Analytics
- *Some use both M&S approaches*
 - A3/5 Training: Continuation Training
 - A3/5, Acq: Analytics
- *None use the same M&S for both approaches at the same time*
 - Few models used in both approaches

Organizations that use both analytics and training should participate in both communities, not have a third M&S management structure



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Closing Thoughts

- **Efficient Organization: Right Size and Right Scope!**
- **Scope:**
 - **7 Surfboards with 5 Crosscutting Functions**
 - **2 Separate Structures for Analytics and Training**
 - **1 M&S 'Belly Button' with divergent M&S responsibilities**
- **Size:**
 - **3 Organizations for Analytics, Training and Both**
 - **2 Organizations for Analytics and Training**
 - **1 Organization for all M&S**
- **Success: Organize for Mission Focus**
 - **Airmen lead air operations, not the supported Army/Navy**
 - **Combat Air Forces and Mobility Air Forces have different missions so we organize them separately**

Respective M&S Experts should lead Analytics and Training M&S